DRAFT

PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

Louisiana Coastal Area, (LCA) Ecosystem Restoration Study

LEAD AGENCY: U.S. Army Corps of Engineers (USACE) - Mississippi Valley, New Orleans District (District). Cooperating Agencies include: Environmental Protection Agency, Mineral Management Service, Natural Resources Conservation Service, National Marine Fisheries Service, U. S. Geologic Survey, and U. S. Fish and Wildlife Service.

ABSTRACT: As a result of natural coastal processes and human activities, coastal Louisiana has lost more than 1.22 million acres of coastal wetlands within the last 70 years. A study done for this project predicts that 328,000 net acres will vanish over the next 50 years. The cumulative effects of natural processes and human activities resulting in altered hydrology, subsidence, and erosion has altered the deltaic processes from net coastal land building to coastal land loss. The District, along with other Federal and state partners, is conducting this study to address Louisiana's coastal land loss problem. The goal is to develop alternative plans that achieve and sustain a coastal ecosystem that can support and protect the environment, economy, and culture of southern Louisiana and thus, contribute to the economy and well being of the nation. Three restoration opportunities were developed that differed in their near-term features. Restoration Opportunity 1 (RO1) focused on river reintroductions, Restoration Opportunity 2 (RO2) focused on restoring geomorphic structures, and the **Tentatively Selected Plan** (TSP), includes both river diversions and restoration of geomorphic structures. All restoration opportunities included variously scaled (small and medium) near-term restoration features; detailed studies of large-scale long-term concepts; potential demonstration projects under a science and technology program; and programmatic authority to ensure optimal beneficial use of navigation maintenance material and to allow rehabilitation or modification of existing water resources control structures. The TSP, with construction costing $1,961,380,000 would restore: critical deltaic processes with river diversions, critical geomorphic structures by restoring and stabilizing barrier islands, headlands, and shorelines. The TSP would meet all study objectives: establish a dynamic salinity gradient, increase sediment input, maintain critical geomorphic structure, sustain diverse habitats, and reduce Mississippi River nutrient delivery to the outer Gulf shelf to reduce hypoxia. Information discussed in the LCA Main Report and supporting appendices is incorporated by reference in this DPEIS.

Comments: Please send comments or questions on this Draft Programmatic Environmental Impact Statement to the U.S. Army Corps of Engineers, New Orleans District, Attention: William P. Klein, Jr., P.O. Box 60267, New Orleans, LA 70160-0267. Telephone: (504) 862-2540; Fax (504) 862-1892. **The official Closing Date for receipt of comments will be 45 days from the date on which the Notice of Availability of this Draft PEIS appeared in the Federal Register.**

SUMMARY

S.1 GENERAL

This draft Programmatic Environmental Impact Statement (DPEIS) for the Louisiana Coastal Area (LCA) Ecosystem Restoration Study (hereinafter LCA Study) was prepared by the U.S. Army Corps of Engineers - Mississippi Valley, New Orleans District (District). Cooperating Agencies include: U. S. Environmental Protection Agency; U.S. Department of Interior – U. S. Fish and Wildlife Service and U. S. Geologic Survey; U. S. Department of Commerce – National Oceanic and Atmospheric Administration – National Marine Fisheries Service; U. S. Department of Agriculture – Natural Resources Conservation Service. The LCA Study builds on the restoration strategies presented in the Coast 2050 Plan (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority (1998) and the May 1999, Reconnaissance Report "Section 905(b) (WRDA 86) Analysis: Louisiana Coastal Area, Louisiana—Ecosystem Restoration" (USACE 1999). The LCA Study is authorized through Resolutions of the U.S. House of Representatives and Senate Committees on Public Works, April 19, 1967, and October 19. 1967.

The LCA Study focuses on "lessons learned" from previous Louisiana coastal restoration efforts, the existing Coast 2050 restoration strategies, and the best available science and technology to develop a tentatively selected plan that addresses the most critical ecological needs of the coastal area and has features that can be implemented within the next 5-10 years, demonstration projects to resolve scientific and engineering uncertainty, and large scale studies of long-range feature concepts.

S.2 PURPOSE

The purpose of this study is to:

- Identify the most critical human and natural ecological needs of the coastal area.
- Present and evaluate conceptual alternatives for meeting the most critical ecological needs.
- Identify the kinds of restoration features that could be implemented in the near-term that address the most critical ecological needs, and propose to address these needs through detailed development and authorization of features that provide the highest return in net benefits per dollar of cost.
- Establish priorities among the identified near-term restoration features.
- Describe a process by which the identified priority near-term restoration features could be implemented.
- Identify the key scientific uncertainties and engineering challenges facing the effort to protect and restore the ecosystem, and propose a strategy for resolving them.
- Identify, assess and, if appropriate, recommend feasibility studies that should be undertaken over the next 10 years to fully explore other potentially promising large-scale restoration concepts.

- Present a strategy for addressing the long-term needs of coastal Louisiana restoration beyond the 10-year focus of the LCA Plan.

S.3 NEED

Mississippi River water and sediments from 31 states and 2 Canadian provinces helped form the Louisiana coastline through what is known as the "deltaic process." According to U.S. Geological Survey (USGS) data, there are approximately 3.67 million acres of coastal wetlands in Louisiana. Louisiana accounts for about 30 percent of all coastal marshes within the lower 48 states (USGS 2000; Field et al., 1991; Dahl 2000). However, nearly 90 percent of all coastal land loss in the lower 48 states today is occurring within Louisiana. As a result of natural coastal processes and human activities, coastal Louisiana has lost more than 1.22 million acres of coastal wetlands within the last 70 years (Dunbar et al., 1992; Barras et al., 1994; Barras et al., 2003). As recently as the 1970s, the loss rate for Louisiana's coastal wetlands was as high as 25,600 acres per year (about 40 square miles). A recent USGS study estimates that a total land loss of 674 square miles and a total land gain of 161 square miles will occur by 2050. Thus, the projected net land loss by 2050 is 513 square miles.

S.4 CAUSES OF LAND LOSS

Louisiana's coastal land loss is the result of complex interactions among natural and human activities upon the landscape. Therefore, it is difficult to isolate any one activity as the singular cause of a specific area of coastal land loss. Many studies have been conducted to identify the major contributing factors (Boesch et al., 1994; Turner 1997; Gagliano 1998; Penland et al., 2000; Day et al., 2000; Morton 2002). Essentially, most studies agree that coastal land loss and the massive degradation of the coastal ecosystem can be attributed to a combination of natural and human factors. Natural factors include: land subsidence, geologic faulting, compaction of muddy and organic sediments, global sea-level change, and erosion from storms and hurricanes. Human influences on the landscape include: construction of levees, flood control structures, navigation channels and oilfield canals with their associated dredged material embankments, jetties, boat and ship traffic, and mineral extraction. The interaction of these and other causes have produced complex patterns and time sequences of stress to the ecosystem, leading to substantial loss of coastal land.

The continued loss of Louisiana's coastal wetlands places the following wetland functions and values at risk: commercial and recreational fishery resources; Mississippi Flyway waterfowl wintering habitat; resting and refueling areas for neotropical migrant birds; barrier reefs, headlands, shorelines, and islands that provide vital habitat for many species of fish and wildlife, including threatened and endangered species.

Equally important are the social and economic consequences resulting from coastal land loss. Overall, up to $100 billion of critical energy, transportation, and industrial infrastructure in the coastal zone is at increased risk from storm damage if coastal land loss continues unabated. The following human environmental sectors are linked, and thus impacted, by continuing coastal landscape degradation and loss: inland and deep draft navigation; flood control; water supply; agriculture (within Louisiana and Nationally); tourism/recreation; hunting and fishing; utility

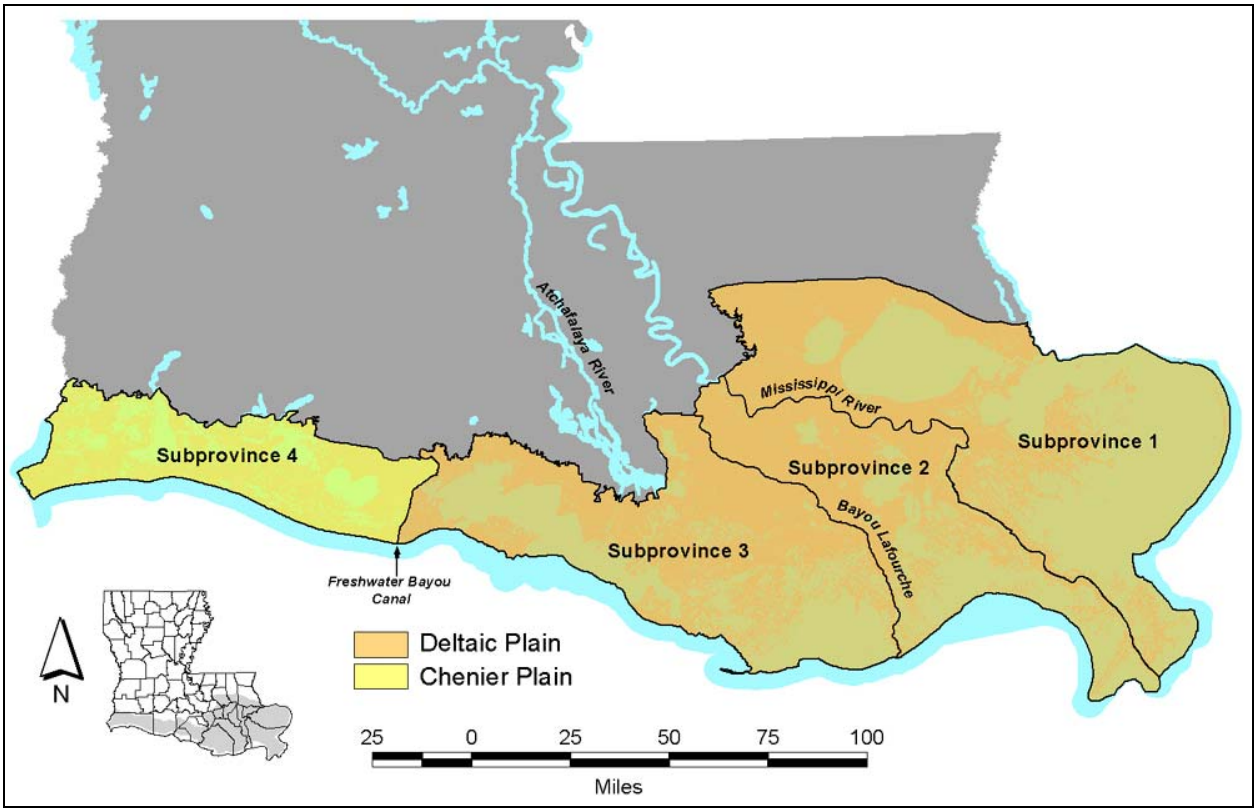
supply and infrastructure; water quality; general industry; onshore oil and natural gas facilities; habitat and species protection; social, economic, and cultural resources; private residences and businesses; and national security issues.

S.5 STUDY AREA

The study area is Louisiana's coastal area from Mississippi to Texas. This area contains two major provinces that were formed by different geologic processes: the Deltaic Plain and the Chenier Plain. The Deltaic Plain has been divided into three hydrologic subprovinces. The Chenier Plain forms a fourth subprovince (**figure S-1**).

Deltaic Plain
Subprovince 1: Eastern lower Mississippi River delta, Pontchartrain, Lower Pearl, and Breton Sound Basins.
Subprovince 2: Barataria Basin, including the western lower Mississippi River delta.
Subprovince 3: Lower portions of Teche-Vermilion, Atchafalaya, and Terrebonne Basins.
Chenier Plain
Subprovince 4: Lower portions of Calcasieu/Sabine and Mermentau Basins.

Figure S-1. The LCA Study Area



S.6 PUBLIC INVOLVEMENT

Six scoping meetings regarding the comprehensive coast wide restoration course of action were held at the start of this study in April and May 2002. Over 300 comments were received which were summarized in a Scoping Report furnished to all participants. Three sets of public meetings were held during the initial plan formulation efforts. Nearly 350 people attended 4 meetings in February 2003 where comments were requested on plan formulation. Nearly 300 participants attended four meetings to discuss the 32 subprovince alternatives in May and June 2003. Over 250 people came to 4 meetings in August 2003 to discuss 7 coastwide alternative frameworks. In July and August 2003, 11 stakeholder discussion groups were held.

A Notice of Intent to refocus and modify the draft programmatic supplemental EIS fro the LCA Comprehensive Study and prepare a DPEIS for the near-term course of action was published in the Federal Register (Volume 69, No. 68) on April 8, 2004. During development of the near-term course of action, 5 scoping meetings were held in April 2004 to receive input on two scoping questions, the sorting and critical needs criteria for screening and selecting the near term course of action, and 79 proposed near-term restoration features. Approximately 215 people attended and 104 individuals or groups submitted a total of 266 individual comments. A summary of the effort was provided in a Scoping Report sent to all scoping participants who provided addresses.

Public input from the 34 meetings has been considered throughout the study.

S.7 AREAS OF CONTROVERSY AND UNRESOLVED ISSUES

1. Public support, especially in St. Bernard Parish, for closure of the Mississippi River Gulf Outlet (MRGO) versus navigation interests to keep the channel open.
2. Widespread demand by Terrebonne and Barataria Basins residents for the immediate restoration of the Barataria-Terrebonne Estuary before other regions of the United States.
3. Divided public support between comprehensive, long-term restoration efforts versus near-term restoration efforts.
4. Widespread public demand for the immediate construction of restoration actions versus requirements for conducting additional study of restoration problems.
5. Localized public support, especially in Subprovince 3, for restoration of the Bayou Chevreuil reef.
6. Public concern for additional salinity controls in the Chenier Plain and inclusion of additional restoration features for this subprovince in the implemented LCA Plan.
7. Public support in Subprovince 3 for the immediate implementation of the Bayou Lafourche reintroduction.
8. Public support for the immediate construction of the Third Delta Conveyance channel.
9. Widespread public concern that oyster lease issues will make restoration efforts prohibitively expensive.
10. Public concern that diversions will over-freshen receiving basins.

11. Concern that diversions could create widespread algae blooms in interior bays and lakes.
12. Concern with changing the existing operational scheme of the Old River Control Structure in regulating river flows in the Mississippi and Atchafalaya Rivers.
13. Concern that LCA restoration features in Subprovince 3 would move too much additional water and sediment into the area.
14. Concern with impediments to navigation and proposed re-routing of the Mississippi River and the Atchafalaya River Navigation channels.
15. Real property rights issues such as public access, mineral rights, and the public's perception that federal monies are being spent on restoring private properties.
16. Widespread public support that protection of people and culture should take precedence over ecosystem restoration.

S.8 DEVELOPMENT AND EVALUATION OF ALTERNATIVES

The Project Delivery Team (PDT) for this study was an interagency, interdisciplinary team composed of representatives of all Cooperating Agencies who were collocated at the New Orleans District, academics, and several disciplines from the District. Using the ecosystem scale strategies for coastal restoration from the Coast 2050 Plan as a guide, the PDT assembled into sub-groups to develop restoration features to fit the strategic requirements of each subprovince. This phase identified and developed a range of restoration features to address general and specific needs and objectives.

The PDT developed 166 potential restoration features that would support the restoration strategies identified for each of the subprovinces in Phase II and that would achieve some level of the planning scales identified in Phase I. Because the intent of this effort was to provide an initial identification of the most effective frameworks for meeting the overarching study objectives in concert with key strategies in each Subprovince, the potential restoration features represent surrogates for planning purposes. These features provide a starting point for identifying the most efficient framework combinations, most effective steps for addressing critical ecosystem needs, and estimating the overall cost of the ultimate implementation effort. The final determination of feature scale and location will be addressed in decision documents subsequent to and contingent upon the approval of this report. In developing the restoration features, the PDT took advantage of the extensive experience gained from other coastal restoration efforts, such as the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA). With a series of restoration frameworks developed for each subprovince, the next plan formulation step was combining subprovince frameworks into coastwide frameworks. An array of 7 possible coastwide frameworks, with a total of 79 restoration features, was identified.

The PDT recognized that the relative uncertainty of quantifying ecologic performance and sustainability versus the somewhat more certain quantification of implementation cost causes a variable effect on certainty across the range of features considered in the alternative frameworks. Particularly, larger-scale, longer-range restoration features compare poorly in a comparative analysis; their lower confidence limits have implications for the overall timing of their

implementation. Conversely features that can be implemented and produce environmental outputs in the near-term result in a higher degree of confidence.

Recognition of these uncertainties, in addition to Federal and state funding constraints, led the PDT to conclude that the LCA Plan should include: features to address near-term restoration opportunities that have a high degree of certainty; that could begin construction within the next 5 to 10 years; demonstration projects that would resolve scientific or technical uncertainties; large-scale studies of long-range feature concepts to more fully capture restoration opportunities; and request programmatic authority to ensure optimal beneficial use of ongoing navigation maintenance material.

Since the 7 identified coast wide frameworks represented the most efficient, effective, and complete combinations of features, the features included in these frameworks were used as the starting point for the identification of the LCA Plan. Sorting criteria were developed to identify which of the 79 features included in the coastwide frameworks would be representative of the various plan component categories described above.

1. Sorting Criteria #1 - Engineering and design complete and construction started within 5-10 years.
2. Sorting Criteria #2 - Based upon sufficient scientific and engineering understanding of processes.
3. Sorting Criteria #3 - Implementation is independent, does not require another restoration opportunity to be implemented first.

Critical needs criteria were developed to help identify the ability of the restoration feature to address critical needs.

1. Critical Needs Criteria #1 - Prevents future land loss where predicted to occur and potentially restores past land loss.
2. Critical Needs Criteria #2 - (Sustainability) Restores fundamentally impaired deltaic function through river reintroductions.
3. Critical Needs Criteria #3 - (Sustainability) Restores or preserves critical geomorphic structure.
4. Critical Needs Criteria #4 - Protects vital socio-economic resources.

Each of the 79 features was analyzed through the sorting and critical needs criteria to determine their appropriate relationship to the LCA Plan: a potentially promising restoration concept requiring a large-scale study, a feature involving some scientific or technical uncertainty requiring a potential demonstration project, or a potential near-term priority restoration feature. Thirty-one restoration features were deemed too extensive to have decision documents complete and construction begun within the first 5-10 years of implementing the LCA Plan and were considered potential large-scale studies. Twenty-three restoration features required resolution of uncertainty that may be provided through potential demonstration projects. Twenty-four independent and combined features could be completed within 5-10 years and underwent critical needs criteria evaluation. Each of the 24 near-term features was analyzed to determine which critical needs criteria it met.

Alternatives were developed based on the individual, and combinations of, critical needs criteria to identify significantly different options for meeting the hydrogeomorphic and ecosystem objectives. The best opportunity to develop alternative courses of action resides in these criteria. While each of these criteria are supporting and complimentary, it is possible to discern alternative combinations of near-term priority features by applying each of the criteria individually or in varying combinations. Possible combinations of the four critical needs criteria produce 15 possible alternative courses of action. The possible alternative near-term feature combinations are outlined in **table S-1** (see also the Chapter 2 "Alternatives" of this DPEIS and the Main Report for more detailed presentation).

Table S-1. Possible Near-Term Feature Combinations Using Critical Needs Criteria

Near-Term Restoration Feature Combinations	Criteria 1 (Prevent Future Land Loss)	Criteria 2 (Restore Deltaic Processes)	Criteria 3 (Restore Geomorphic Structure)	Criteria 4 (Protects Vital Community & Socio-Economic Resources)
A	X			
B		X		
C	X	X		
D			X	
E	X		X	
F	X	X	X	
G		X	X	
H				X
I	X			X
J		X		X
K	X	X		X
L	X		X	X
M			X	X
N	X	X	X	X
O		X	X	X
P				

While the analysis showed similarity between the 15 possible alternatives, three distinct choices arose. Alternative combination B, designated Restoration Opportunity 1 (RO1), focuses on restoration of deltaic processes (critical needs criteria #2). Alternative combination D, designated Restoration Opportunity 2 (RO2), focuses on restoration of geomorphic structure (critical needs criteria #3) including shoreline protection, barrier island restoration, and marsh creation features. The body of knowledge concerning application of coastal restoration strategies in Louisiana suggests that while both of these restoration alternatives would have significant environmental benefits, they each exhibit weaknesses in addressing the complete range of study objectives. Alternative combination N, designated the Plan that Best Meets the Objectives

(PBMO), encompassing all four critical needs criteria is optimal. The PBMO exhibits long-term sustainability as the geomorphic structures serve to protect and buffer the diversion feature influence areas from erosive coastal wave action and storm surge. Additionally, river diversion features are more sustainable because they are continuously connected to the river resource and nourished by its sediment and nutrients (**table S-2**). In the further analysis of the LCA Plan, the PDT has determined that the feasibility study of each feature would analyze and optimize specific locations and dimensions. For example, in the case of diversions, they are initially described as small, medium, and large. These levels equate to: 1,000-5,000 cubic feet per second (cfs), 5,000-15,000 cfs, and greater than 15,000 cfs, respectively

Table S-2. Comparison of Alternative Plan Feature Combinations and Costs.

Potential Near-term Features	Alternative Near-term Plans		
	B	D	N
Mississippi River Gulf Outlet Environmental Environmental Restoration Features		$80,000,000	$80,000,000
Maurepas Swamp Reintroductions --			
Small Diversion at Convent / Blind River	$28,564,000		$28,564,000
Small Diversion at Hope Canal	$30,025,000		$30,025,000
Amite River Diversion (spoil bank gapping)	$2,855,000		$2,855,000
Barataria Basin Barrier Shoreline Restoration -- Caminada Headland, Shell Island		$181,000,000	$181,000,000
Small Bayou Lafourche Reintroduction	$90,000,000		$90,000,000
Medium Diversion with Dedicated Dredging at Myrtle Grove	$146,700,000		$146,700,000
Calcasieu Ship Channel Beneficial Use of Dredged Material		$100,000,000	$100,000,000
Modifcation of Caernarvon Diversion for Marsh Creation	$1,800,000		$1,800,000
Modifcation Davis Pond Diversion for Marsh Creation	$1,800,000		$1,800,000
Terrebonne Marsh Restoration Opportunities --			
Optimize Flows & Atchafalaya River Influence in Penchant Baisn	$9,720,000		$9,720,000
Multi-purpose Operation of the Houma Navigation Canal (HNC) Lock	$0		$0
Convey Atchafalaya River Water to Northern Terrebonne Marshes	$132,200,000		$132,200,000
Terrebonne barrier shoreline restoration -- Isle Derniere, E. Timbalier		$84,850,000	$84,850,000
Maintain Land Bridge between Caillou Lake and Gulf of Mexico.		$41,000,000	$41,000,000
Medium Freshwater Diversion at White's Ditch	$35,200,000		$35,200,000
Stabilize Gulf Shoreline at Point Au Fer Island		$32,000,000	$32,000,000
Lac des Allemands area Reintroductions --			
Small Diversion at Lac des Allemands	$17,330,000		$17,330,000
Small Diversion at Donaldsonville	$16,670,000		$16,670,000
Small Diversion at Pikes Peak	$12,940,000		$12,940,000
Small Diversion at Edgard	$13,100,000		$13,100,000
Total Near-term Plan Construction Cost	**$538,904,000**	**$518,850,000**	**$1,057,754,000**

S.9 THE TENTATIVELY SELECTED PLAN (TSP)

Of the 3 near-term alternatives, the PBMO would best address the most immediate and critical needs of the ecosystem by promoting the distribution of riverine freshwater, nutrients, and sediments using natural processes and ensuring the structural integrity of the estuarine basins. Only the PBMO, of the three restoration opportunities, meets all study objectives. It accomplishes hydrogeomorphic objective #1 (establish dynamic salinity gradients), #2 (increase

sediment input), and #3 (sustain natural landscape features). It also achieves ecosystem objective #1 (sustain diverse habitats). PBMO would have a minor effect in achieving ecosystem objective #2 (reducing gulf hypoxia). However, there is future opportunity to expand on achieving this particular objective. The PBMO was formulated using the study guiding principles.

However, following sequencing the PDT used its experience and technical implementation solutions for scheduling components using the guidelines, assumptions, and rules described previously. While the PDT attempted to include all PBMO components into the ten-year implementation schedule, the assumptions and rules precluded the simultaneous implementation of all the PBMO components. Discussions with the non-Federal sponsor led to the conclusion of the PDT that a limitation of approximately $200 million annual project expenditures was appropriate (attachment 3 Non-Federal Sponsor Financial Capability of the Main Report). The inclusion of all plan components would force the implementation schedule to either exceed the maximum funding limitation of approximately $200 million per year, or would force initial construction of some features in the PBMO beyond the first 10 years.

In all of the implementation sequences, the Penchant Basin Restoration and the Lac Des Allemands Reintroductions were found to be beyond the 10-year implementation window. Because of the study purpose to detail a plan that includes restoration features brought to construction within the first 10 years. Hence these two restoration features were dropped from the PBMO and are not in the Tentatively Selected Plan (TSP).

Furthermore, science and technology (S&T) uncertainties necessitate the need for a strong and continued science and technology development supported by demonstration projects. In addition the existence of significant existing water resource projects offer the opportunity for modifications of these projects to advance restoration (modifications to existing structures and increased beneficial use). To better achieve completeness and effectiveness, the PDT incorporated these two additional programmatic plan components. Hence, this multi-component TSP represents the best near-term approach for addressing ecosystem degradation in Louisiana. The LCA program relies on Congressional approval of the TSP as a framework for programmatic and future authorization actions. Consequently, the study results indicate that the most effective, sustainable, and implementable plan to address the critical near-term ecosystem restoration needs in the state of Louisiana is the Tentatively Selected Plan (**table S-3**).

Components of the Tentatively Selected Plan

Components of the TSP are:

- Programmatic authorization of initial Near-term Critical Restoration Features;
- Programmatic authorization of Science and Technology Program;
- Programmatic authorization of Science and Technology Program Demonstration Projects;
- Programmatic authorization for the Beneficial Use of Dredged Material, and programmatic authorization to Initiate Studies of Modifications to Existing Water Control Structures;

- Future Congressional authorization required for the remaining components of the TSP in subsequent WRDAs; and
- Feasibility studies for the continued development of long-term and large-scale restoration concepts.

Components of the LCA Tentatively Selected Plan recommended for programmatic authorization (implemented with programmatic approval authority):

1. Near-Term Critical Restoration Features: The principal component of the PBMO is the group of feature opportunities identified to meet the critical near-term ecosystem needs of the Louisiana coastal wetlands.

(1) MRGO Environmental Restoration Features
(2) Small Diversion at Hope Canal
(3) Barataria Basin Barrier Shoreline Restoration, Caminada Headland, Shell Island.
(4) Small Bayou Lafourche Reintroduction.
(5) Medium Diversion at Myrtle Grove with Dedicated Dredging.

2. Science and Technology Program: Establishment of a Science and Technology Program to address both near and long-term uncertainties in the implementation and execution of the plan. The Science and Technology Program would be responsible for identifying appropriate potential demonstration projects and documenting the findings for application in the LCA program.

3. Initial Science and Technology Program Demonstration Projects: Includes the execution of focused demonstration projects to resolve specific uncertainties and provide insight to the programmatic short and long-range implementation of the LCA Plan. The following demonstration projects area proposed:

- Wetland Creation in the Vicinity of Barataria Chenier Unit (freshwater chenier restoration).
- Pipeline Conveyance of Sediment to Maintain Land Bridge.
- Pipeline Canal Restoration (various methods and locations).
- Shoreline Erosion Protection Test Sections in the Vicinity of the Rockefeller Refuge.
- Barrier Island Segment Sources Demonstration in Vicinity of Terrebonne Barrier Islands.

4. Programmatic Authority for the Beneficial Use of Dredged Material.

5. Programmatic Authority to Initiate Studies of Modifications to Existing Water Control Studies.

Components of the LCA Tentatively Selected Plan recommended for approval with future authorization (implemented with standard approval authority):

6. Other Near-Term Critical Restoration Features

(6) Multipurpose Operation of the Houma Navigation Canal Lock.
(7) Terrebonne Basin Barrier-Shoreline Restoration, East Timbalier, Isle Dernieres.

(8) Maintain Land Bridge between Caillou Lake and Gulf of Mexico.
(9) Small Diversion at Convent / Blind River.
(10) Increase Amite River Diversion Canal Influence by gapping banks
11) Medium Diversion at White's Ditch
(12) Stabilize Gulf Shoreline at Pointe Au Fer Island
(13) Convey Atchafalaya River water to Northern Terrebonne Marshes
(14) Re-authorization of Caernarvon Diversion – optimize for marsh creation
(15) Re-authorization of Davis Pond – optimize for marsh creation

7. Large-scale and Long-term Concepts Requiring Detailed Study: The identification of large-scale, long-range studies of long-term restoration concepts typically define fundamental changes to the hydrogeomorphic or ecologic structure, function, or management of the Louisiana coast. These concepts, which represent significant opportunities for coastal restoration, require detailed study and development to determine the probable impacts (beneficial and adverse) of such features in order to determine if these projects are desirable and can be integrated into the plan for coastal restoration. These concepts also include some levels of uncertainty, which are typically so extensive in scale that resolution through a demonstration project is impractical. As a general rule, large scale diversions (flow greater than 15,001 cfs) were deemed impractical in the near-term because of their being mutual exclusive with significant concepts such as Third Delta. River resource hydrodynamic studies would necessarily evaluate these larger scale diversions in concert.

The large-scale, long-term concepts identified in the TSP include:

- Mississippi River Hydrodynamic Model
    - Mississippi River Delta Management Study
    - Third Delta Study
    - Upper Atchafalaya Basin Study including evaluation of alternative operational schemes of Old River Control Structure *funded under MR&T*
- Chenier Plain Freshwater Management and Allocation Reassessment Study
- Acadiana Bay Estuarine Restoration Study

Table S-3
TSP Recommended Component Cost Estimates
(June 2004 Price Levels)

Item			Cost ($)
MRGO environmental restoration features		$	80,000,000
Small diversion at Hope Canal		$	30,025,000
Barataria Basin Barrier shoreline restoration, Caminada Headland, Shell Isl.		$	181,000,000
Small Bayou Lafourche reintroduction		$	90,000,000
Medium diversion at Myrtle Grove w/ possible dedicated dredging		$	146,700,000
	SUBTOTAL	$	527,725,000
Real Estate		$	66,439,000
First cost	SUBTOTAL	$	594,164,000
Feasibility Level Decision Investigations and NEPA Documentation		$	55,609,000
PED		$	37,072,000
Near-term Approval and Implementation Documentation Cost	SUBTOTAL	$	92,681,000
Engineering & Design (E&D) / Supervision & Administration (S&A)		$	99,265,000
Programmatically Authorized TSP Cost		**$**	**786,110,000**
Science & Technology Program Cost (10 year Program)		**$**	**100,000,000**
Demonstration Program Cost (10 year Program)*		**$**	**175,000,000**
Beneficial Use Dredge Material Program*		**$**	**100,000,000**
Modification of Existing Structures		**$**	**10,000,000**
Total Programmatically Authorized TSP Cost		**$**	**1,171,110,000**
Multi-purpose operation of the Houma Navigation Canal Lock #		$	-
Terrebonne Basin Barrier shoreline restoration E. Timbalier, Isle Dernieres		$	84,850,000
Maintain Land Bridge between Caillou Lake & Gulf of Mexico		$	41,000,000
Small diversion at Convent / Blind River.		$	28,564,000
Amite River diversion (spoil banks gapping)		$	2,855,000
Medium diversion at White's Ditch		$	35,200,000
Stabilize Gulf Shoreline at Pointe Au Fer Island		$	32,000,000
Convey Atchafalaya River Water to Northern Terrebonne marshes		$	132,200,000
Caernarvon - optimize for marsh creation (project modification)		$	1,800,000
Davis Pond - optimize for marsh creation (project modification)		$	1,800,000
	SUBTOTAL	$	360,269,000
Real Estate		$	208,100,000
First cost	SUBTOTAL	$	568,369,000
Feasibility Level Decision Investigations and NEPA Documentation		$	54,100,000
PED		$	36,067,000
Near-term Approval and Implementation Documentation Cost	SUBTOTAL	$	90,167,000
Engineering & Design (E&D) / Supervision & Administration (S&A)		$	71,734,000
Conventionally Authorized TSP Cost		**$**	**730,270,000**
Mississippi River Hydrodynamic Study		$	10,250,000
Third Delta		$	15,290,000
Upper Atchafalaya Basin Study w/ Mod Operations of Old Riv Control ^		$	-
Chenier Plain Freshwater Management and Allocation Reassessment		$	12,000,000
Mississippi River Delta Management Study		$	15,350,000
Acadiana Bay Estuarine Restoration		$	7,110,000
Large-scale Studies Cost		**$**	**60,000,000**
Total Conventionally Authorized TSP Cost		**$**	**790,270,000**
Total LCA Restoration TSP Cost		**$**	**1,961,380,000**

*Program total costs include any estimated Real Estate costs for these activities

Feature of the Mississippi River and Tributaries, Morganza Louisiana to the Gulf of Mexico Hurricane Protection project recommended in the reports of the Chief of Engineers dated 23 August 2002 and 22 July 2003.

^ Study to be funded under the Mississippi River and Tributaries authority

S.10 COMPARISON OF IMPACTS

In the future without-project conditions, offshore sand deposits would be subject to the multiple uses presently occurring. RO1, which focuses on restoration of critical deltaic processes, would have no impact on these deposits. RO2, which focuses on restoration of critical geomorphological structures, would require about 61,100,000 cubic yards (cy) of sands that would probably be removed from Ship Shoal and the Barataria Basin offshore sites. There would be temporary adverse impacts on benthos. Disturbance of large areas of gulf bottoms could change wave and littoral drift dynamics. The TSP, which is a combination of RO1 and RO2 features, would remove these same resources and have impacts similar to RO2.

Hydrodynamic models of the future without-project conditions indicated salinities fresher than those presently found in the influence areas of the Caernarvon and Davis Pond Diversions. The Subprovince 3 model indicated salinities of less than 4 parts per thousand (ppt) over much of the basin except in Vermilion Bay to the west and Timbalier and Terrebonne Bays with their northern wetlands and areas south of the Marmande and Mauvais Bois Ridges. None of the restoration opportunities would change salinity in the Chenier Plain. RO1 increases introduction of Mississippi River water and sediment, as well as improves management of Atchafalaya River water in Subprovince 3, which provides significant improvements in connectivity and material exchange. Salinity regimes with RO1 would be similar to the future without-project conditions, except there would be localized freshening in the following areas: Lake Borgne, the northern part of Breton Sound, Caminada Bay and the nearby headland areas, and the upper reaches of the Terrebonne and Timbalier Bays and marshes directly north of these bays. RO2 would essentially not change salinity regimes from the future with no action. The TSP would change salinities in a manner similar to RO1.

Louisiana's barrier resources are expected to decline significantly in the future without-project conditions due to continuing natural and human-induced processes. RO1 would have essentially no impact on these resources. RO2 would have the long-term significant impact of restoring 32 miles of these resources. The TSP would be more beneficial than RO2 because it would not only restore the 32 miles of the barrier system, but would also provide diversions that would synergistically impact the estuarine system.

About 328,000 acres of Louisiana's marshes and swamps could be lost by 2050. RO1 would increase the acreage of all wetland habitats compared to future without-project conditions. However, over the 50-year project life, a net decrease in total wetland vegetative habitats from today's acreage is predicted to occur. In the Deltaic Plain, RO1 would minimally-to-significantly increase fresh and intermediate marsh and swamp wetland forest. It would slightly increase brackish and saline marsh. The rate of loss of barrier shoreline vegetation would be similar to the future without-project conditions. RO2 would increase barrier shoreline vegetation in Subprovinces 2 and 3. In Subprovince 4, all marsh types could slightly increase. There could be an increase in all marsh types, depending on the location of the beneficial use sites. Although there would be a net gain in vegetated wetlands compared to no action conditions, there would be a decrease from present conditions. The cumulative impacts of the TSP would be a synergistic result over and above the additive combination of impacts of RO1 and RO2. The

diversions and restored barrier islands and shorelines would complement each other and together result in more benefits to vegetated wetlands than either alone.

Louisiana's coastal wetlands would continue suffering extensive land loss in the future without-project conditions thereby decreasing the quantity and quality of habitats for amphibians, reptiles, mammals, and birds. There would be less stopover habitat for neotropical migratory birds. Endangered piping plover critical habitat would continue to be lost. RO1 would benefit wildlife that prefer fresher conditions (most game mammals, furbearers, reptiles and amphibians). Wintering habitat for waterfowl would be created/protected. RO2 would especially benefit migratory avian species because important stopover habitat for neotropical migrant birds would be protected. Habitat for threatened and endangered species, especially critical piping plover habitat, would also be increased. The TSP would have positive synergistic impacts over and above the additive combination of impacts of RO1 and RO2.

The LCA study area supports one of the most productive fisheries in the Nation. Fishery resources are expected to decline in the future without-project conditions as open water replaces wetland habitat and the extent of marsh-water interface begins to decrease. The multiple diversions in RO1 would have the potential to significantly freshen large areas within, and possibly an entire basin. Less fresh water tolerant species, such as brown shrimp and spotted seatrout may be displaced from areas near diversions or entire hydrologic basins. The extent of this impact is dependent on the diversion location, size and operation. Species such as Gulf menhaden, blue crab, white shrimp and red drum would likely benefit from RO1 as would freshwater fishery species. With RO2, adverse impacts to fisheries would be significantly less. The TSP should have impacts similar to RO1. All of these restoration opportunities would have an overall benefit to fisheries compared to the future without-project conditions.

Oyster resources are anticipated to decline in the future without-project conditions as the quality of their habitat decreases and they are more exposed to the open gulf. RO1would cause continued sedimentation and over freshening, which could result in permanent loss of oyster, populations especially in Subprovinces 1 and 2. Some populations outside the over freshened areas could benefit. RO2 would have minimal, localized impacts due to increased turbidity and siltation caused by construction, dredging and disposal activities. The TSP would have synergistic impacts over and above the additive combination of impacts of RO1 and RO2.

There would be continued loss and degradation of essential fish habitat (EFH) as well as the ability of the LCA study area to support Federally managed species in the future without-project conditions. RO1 would preserve some highly productive categories of EFH that would be lost in the future without-project conditions. RO2 would also preserve some highly productive forms of EFH, this preservation is not expected to be sustainable. The TSP best preserves some highly productive categories of EFH.

Continued coastal land loss and deterioration under future without-project conditions would also adversely impact threatened and endangered species that utilize the study area. The piping plover, brown pelican, and sea turtles would be the most impacted. RO1 would have little impacts on these species. In contrast, RO2 would significantly enhance and create piping plover critical habitat. Sea turtles beach habitat would also benefit. The TSP would have synergistic

positive impacts over and above the additive combination of impacts and benefits of RO1 and RO2.

Should the trend of increased precipitation and climate warming continue, there would be increased runoff into which may affect the total volume of fresh water in each subprovince. Overall flow in rivers and channels would remain above long-term averages, which would maintain an increased sediment load. Increased urbanization and construction could also increase runoff and sedimentation. RO1 would cause an increase in the volume of water and sediment entering each diversion receiving area, which may result in changes in water levels. RO2 would have minimal impacts on water levels; however, construction of restoration features may relocate sediment depocenters. Impacts of the TSP would be a synergistic combination of RO1 and RO2.

Most fresh surface water supplies would be from the Mississippi and Atchafalaya Rivers and their distributaries in the future. However, salinities could increase in Bayou Lafourche, which would mean users would have to treat water for salinity or find new freshwater sources. RO1 could negatively impact freshwater supplies to users downstream of medium diversions. It would increase flows into receiving areas of Subprovinces 1 and 2, Bayou Lafourche and the Terrebonne marshes, which would increase freshwater supplies to these users. RO2 would have negligible impacts. The TSP would have impacts similar to RO1.

The LCA study area, in the future without-project, would still be affected by other activities that would have both beneficial and detrimental effects on water quality. RO1 would increase sediments in the coastal zone with accompanying minor increases in trace metals and also increase agrochemicals. Nutrient enrichment could possibly lead to increased algal blooms. RO2 would have negligible effects on water quality. The TSP would have impacts similar to RO1.

Gulf hypoxia would continue, in the future without-project, to present the problems it does today. RO1 would result in a relatively small reduction in nutrients discharged into the northern gulf from the Mississippi River. Such a reduction would have a minor positive effect on hypoxia. RO2 would have no impact on hypoxia. The TSP would have impacts similar to RO1.

In the future without-project conditions, historic and cultural resources in the study area would continue to be impacted by the same forces impacting them today. With any restoration opportunity, actions would need to be examined on a project-by-project basis.

As the existing freshwater areas convert to salt-water marsh and then to open water in the future without-project conditions, recreation opportunities would decline accordingly. Another major impact could be the loss of facilities and infrastructure that support or are supported by recreational activities. RO1 would result in an increase in freshwater recreation activities and a displacement and decrease in saltwater activities in areas of freshwater reintroduction. There would be an overall positive effect on most wildlife dependent recreation. Reduction of land loss and land building may protect valuable infrastructure that supports certain recreation activities. RO2 would have long-term positive benefits to saltwater recreation activities. Impacts of the TSP would be a synergistic combination of RO1 and RO2.

Populations in coastal communities are expected to shift inland in the future without-project conditions. With the loss of current wetlands that provide storm surge protection it is likely that coastal infrastructure would suffer increased damages. Slow growth in employment is also expected to occur. Economic opportunities related to wetland resources would be adversely affected as these resources are depleted. With RO1 the inland population shift would be slower. Subsistence fishermen would potentially have to relocate to follow fisheries as salinities change. RO1 would also reduce the necessity for relocation, repair or replacement of infrastructure. Coastal jobs, property and population could be better protected than if nothing were done. RO2 would not require fishermen to relocate. Positive impacts would be similar to, but less than RO1. Impacts of the TSP would be a synergistic combination of RO1 and RO2.

Saltwater intrusion would continue in the future without-project conditions, except in areas where existing freshwater diversions are able to reverse that trend. Wetland habitat losses would decrease productivity of Louisiana's coastal fisheries. The seafood industry would likely suffer significant losses in employment in the future without-project conditions as shrimp, oysters and other valuable species decline. RO1 would cause changes in fishing patterns, including fishery relocations and species harvested. RO2 would not cause fishery relocations. Impacts of the TSP would be similar to those of RO1, except the barrier island and shoreline restoration features of the TSP would not cause fishery relocations. However, these preliminary estimates require additional analysis that would be accomplished during later study phases.

Saltwater intrusion would continue in the future without-project conditions, except in areas where existing freshwater diversions are able to reverse that trend. Production from oyster leases would decline gradually as areas of suitable salinity move inland and overlap with areas closed due to fecal coliform. RO1 includes diversions of a combined capacity that could potentially result in the loss of production on a significant percentage of the total leased acreage in Louisiana. It is unknown whether increased harvest from other areas could offset this loss. The barrier island and shoreline restoration features of RO2 would have minimal, localized impacts in areas where construction occurs. Diversions and barrier system restoration features of the TSP would generally have synergistic impacts (probably both negative and positive) on oyster leases, the extent of which is difficult to predict at this time. However, these preliminary estimates require additional analysis that would be accomplished during later study phases. Oyster surveys and modeling, where appropriate, should be conducted to determine the spatial, temporal, and cumulative impacts to private and public oyster resources in the affected environment.

Onshore oil and gas facilities and pipelines are generally not designed to accept wind and wave forces that could be experienced in the future without-project conditions. The owners would be faced with the decision to protect these facilities or curtail production. If any of the supply bases that service the offshore industry were impacted as a result of future erosion, the operational cost of offshore production could increase. Impacts to the price of crude oil or natural gas could ripple through the National economy. RO1 would provide some protection to these assets, potentially avoid the cost of relocation, and protect jobs. RO2 would provide an increased level of protection to the Loop Facility by restoration of some of the Caminada-Moreau Headland. Impacts of the TSP would be a synergistic combination of RO1 and RO2.

All Louisiana's major ports and waterways are projected to have positive annual growth over the next 50 years. RO1 would repair and improve the GIWW, which would have positive impacts to navigation. If the final MRGO restoration features in RO2 were to include a closure or restriction, there would be direct negative impacts to navigation traffic. Impacts of the TSP would be a synergistic combination of RO1 and RO2.

Most hurricane protection levees would be at greater risk in the future without-project conditions, than they are at present. RO1 would help preserve and rebuild some of the marsh that reduces storm surge thereby providing some protection to hurricane protection levees. RO2 would rebuild some marsh, as well as barrier systems that also would help reduce storm surge thereby providing some protection to levees. Impacts of the TSP would be a synergistic combination of RO1 and RO2.

Impacts to agriculture and forestry in the future without-project conditions would be negative: continued saltwater intrusion, continued coastal erosion, and increased damages from storms. RO1 would benefit agriculture and forestry by reducing saltwater intrusion into bayous and canals. RO2 would indirectly offer some protection to agricultural lands. Impacts of the TSP would be a synergistic combination of RO1 and RO2.

In addition, the TSP successfully meets the USACE Environmental Operating Principles.

S.11 CONSISTENCY WITH OTHER EFFORTS

The District recognizes the need to ensure that development activities do not undermine or conflict with coastal restoration efforts. All alternatives would include actions to help minimize potential conflict between coastal restoration efforts and hurricane protection projects, navigation projects, and other forms of coastal development.

S.12 ADAPTIVE MANAGEMENT AND MONITORING

Adaptive management and monitoring would be an integral part of the LCA effort. Monitoring may reveal where projects have exceeded or fallen short of a desired response. It would be necessary to constantly assess the landscape and ecosystem response to the restoration actions. Such information may necessitate changes in design and/or operation for both existing and future projects to ensure that the selected alternative reaches the expected targets. It is also possible that monitoring would reveal where the expectations for the ecosystem should be adjusted to reflect new understandings with respect to the effectiveness of specific projects or types of projects. Hence, both the expectations and the projects would be subject to change in response to new data and the evolving scientific understanding of coastal restoration in Louisiana.

S.13 CONCLUSIONS AND RECOMMEDATION

This DPEIS and the Main Report compare the future without-project conditions with three restoration opportunities that differ in their near-term features. RO1 focuses on restoration of critical deltaic processes primarily via river reintroductions; RO2 focuses on restoration of

critical geomorphic structure, including essentially uninhabited barrier islands; and the TSP is a synergistic combination of features found in RO1 and RO2. All restoration opportunities include detailed studies of large-scale long-term concepts, potential demonstration projects under a science and technology program, include a request for programmatic authority to ensure optimal beneficial use of navigation maintenance material, and to modify operation of existing water resources control structures (e.g., Davis Pond and Caernarvon).

RO1 and the TSP would accomplish hydrogeomorphic objectives #1 and #2. In the Deltaic Plain, these restoration opportunities would reintroduce freshwater and sediment from the Mississippi River at multiple locations and at different scales. Components of RO2 and the TSP are directed at hydrogeomorphic objective #3 through conservation and restoration of barrier islands and shorelines, and critical land bridges. RO1 and the TSP would meet ecosystem objective #1 by increasing total wetland area in all subprovinces compared to future with no action. The increased introduction of Mississippi River water and sediment, as well as the improved management of Atchafalaya River water throughout Subprovince 3, would provide significant opportunities to improve connectivity and material exchange. Both of these alternatives would increase vegetative productivity in Subprovinces 1-3 compared to future without-project conditions. RO1 and the TSP would meet ecosystem objective #2 by slightly reducing Gulf of Mexico hypoxia.

The TSP, with construction costing$$1,961,380,000 would restore: critical deltaic processes with river diversions; critical geomorphic structures by restoring and stabilizing barrier islands, headlands, and shorelines; and would meet all the study objectives: establish a dynamic salinity gradient, increase sediment input, maintain critical geomorphic structure, sustain diverse habitats, and reduce Mississippi River nutrient delivery to the outer Gulf shelf to reduce hypoxia.

DRAFT

PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

Louisiana Coastal Area, (LCA) Ecosystem Restoration Study

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES